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WHY BUSINESSES (SMES) SHOULD ADOPT CLOUD COMPUTING

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ABSTRACT

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Cloud computing is the most evolving concept which has optimized IT performance of SMEs sector without huge cost on infrastructure. It is an on-demand computing service which provides pay per use opportunity to SMEs; this research study is explaining different advantages of cloud computing which motivates SMEs to adopt these services. SMEs do not have large amount of financial and human resources, so they are not able to implement and upgrade advance technologies to increase their business performance. The main purpose of this research study is to explain how SMEs can be benefited by using cloud computing for their businesses and make suggestion about potential disadvantages. A detailed literature review is gathered to discuss basic concepts of cloud computing and its implementation in SMEs. Furthermore, advantages of cloud computing are also discussed by associating with existing theory. A qualitative approach is selected to direct this study by focusing on interpretivism research philosophy. A convenient sampling method is used to choose six SMEs operating in Oulu and other cities in order to gather data. An unstructured questionnaire is used to conduct interviews from IT personals working in these SMEs. Findings of research study suggest that most important factors which leads SMEs towards adoption of cloud computing includes, cost effectiveness, flexibility and scalability in resource utilization, lower technology risk, data security and effective IT support. Some other factors related to service providers has also been identified in this study as well, for instance trust on service providers is considered an important factor while making decision about cloud adoption. Trial-ability of cloud services makes it more convenient for SMEs to implement best suitable services as per their business environment.

Keywords: Cloud Computing, SMEs, Technology

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1 INTRODUCTION

In modern world, the competition among business sector is quite high because of the development of technological sector and evolvement of business markets. Thus, all the existing skills and products are becoming obsolete in this technological world (Pauly 2011, 461-503). Such as, limited availability of resources to small and medium enterprise (SMEs) make them unable to compete in market. SMEs have less competitive advantage because they cannot access modern technologies to perform IT operations. On the other hand, SMEs are very important for economic development of a country as it increase the employment rate and decrease the need of imported products. They can produce many products on lower cost and provide large amount of employment to local people (Marston et al. 2011, 176-189). However, they can produce more efficient output by implementing a new strategic direction. A new strategic direction can be decided by focusing on new technology which can provide them competitive advantage in international market as well.

It is important for SMEs to response quickly because business market cannot wait six to eight weeks to get their supplies (Dillon et al. 2010, 27-33). Therefore, SMEs should adopt a new strategy involving a technological solution which may increase innovation, reduce cost and enhance implementation speed. A massive computing power and business insights can be used to generate competitive advantage in this era of globalization information technology (Liu & Orban 2010, 83-91). There are many barriers for SMEs in global market which can be removed with an advanced IT infrastructure. It also offers a degree of flexibility to SMEs and allows them to become more competitive and efficient. Cloud computing is a way to address all these inefficiencies by making a contribution in the growth of an organization specifically SMEs. In information technology services, cloud computing is a paradigm shift which has potential to provide flexibility, efficiency and agility to meet exceptionally growing demand (Iyer & Henderson 2010, 117-131).

In last few years, a development in cloud computing has been noticed worldwide and it provide different facilities to organizations. Such as, storing information, resource sharing, auto-scalability, complete availability are its major services. It also developed a concept of services renting where pay-as-you-go is implacable (Callewaert et al. 2009, 7-18). A new pathway is offered by cloud computing to business sector to increase its competitiveness and agility, which allows them to embrace ready to use cloud support resources like IT structure as business application and service software. Organizations can access IT services on demand and get support whenever

required. This process is way faster than managing an IT resource in house which needs more time in obtaining, installing, configuring of infrastructure (Dillon et al. 2010, 27-33). Therefore, cloud computing has become a game changer for SMEs as it provides scalable competences and infrastructure as services. It provides a way to computing like household utilities as you can use on demand and pay an affordable amount for this utilization (Conway et al. 2014, cited 20.09.2015).

Cloud computing services include hardware, software and platforms which are provided by cloud providers to organizations. It enables them to shift away from computing product to computing service, which is offered from large scale clouds or data centers by using internet. The main difference is that the computing product is owned by cloud user while computing service is delivered to cloud user which can be utilized anytime and anywhere (Catteddu & Hogben 2009, cited 16.8.2015). Therefore, quick service delivery enables SMEs to empower change in IT infrastructure and reengineer their business operations. A fundamental revolution can be made by organization to advance its business application and enhance customer interaction. According to Abdollahzadegan et al. (2009, 67-74) study by 2015 cloud computing could generate business of €763 billion and employment for 2.4 million people in Europe. Nonetheless, Finland is one of the cloud computing users with highest enterprises proportion in EU. As indicated by Eurostat, more than half 51 percent of Finnish enterprises are using cloud computing services (Bourne 2015, cited 16.08.2015).

In spite of the fact that cloud computing is considered as an incipient idea, it is not entirely new concept. Cloud computing term could be new in business sector, though Parkhill (1966) characterized it as novel term for an old aged aspiration of computing as utility. Firstly, in 1969 cloud computing concept was introduced by Licklider, however it evolved over time and became more advanced in IT field after 2000 (Durkee 2010, 20). The foundations of cloud computing are new as it can be observed with its dependence on the web and its association with grid computing and virtualization. Its present universality is a consequence of the Internet explosion, expanded data transmission, cell phones, and portability requirements for clients (Weinhardt et al. 2009, 391-399).

Cloud computing may have potential to exceed expectation of IT and meet all challenges (Harms & Yamartino 2010, 13). However, there is one issue that involving third party in data handling may increase risk. The truth about cloud computing lies among these two extremes and can be determined by different factors (Yang & Tate 2009, 2-4). So, a detail discussion about cloud

computing pros and cons make us unable to settle on one choice. SME's have an apparent inclination toward cloud computing as a result of advantages that could ensue to them. Cloud computing is beneficial for all types of business organization, however small businesses like SMEs have different IT needs and a usage as compare to big organizations (Gupta et al. 2013, 861-874). Therefore, this research report more inclined towards discussing the needs of SMEs, which make essential for them to adopt cloud computing.

1.1 Research Problem

Business market is growing rapidly which has also increased competition among different organizations. Therefore every organization needs to have upgrade abilities and innovation for delivering advanced products and services suitable to market requirements (Pauly 2011, 461-503). SMEs have less competitive advantage to deliver improved products and services because of limited recourses and limited access to modern IT services. Cloud computing provides a solution to all these issues by offering a wide range of services which can remove technological barriers for SMEs in global market. Previous research studies have focused on cloud computing by relating it to innovation and business agility. However, there are many advantages of cloud computing which are not discussed in detail, as it can enhance competitiveness of SMEs in global market. To assist SMEs in adoption of cloud computing, this research study aims to answer the research question "Why Businesses (SMEs) should adopt Cloud Computing"

1.2 Research Purpose

The major purpose of the thesis is to carry out research on the cloud computing in relation with small businesses and analyze its potential benefits to businesses. The main aim is further divided in to following sub objectives.

1. To make a feasibility report for SMEs
2. To explain how SMEs can be benefited by using cloud computing for their businesses.
3. To discuss advantages of adopting cloud computing for storing data
4. To make suggestion about potential disadvantages associated with cloud computing.
5. To analyze various cloud service providers and suggest the best one to adopt.

1.3 Rationale of Study

The research study discusses the major advantages and disadvantages associated with cloud computing technology. So, it provides an opportunity for Finnish SMEs to assess their requirements and implement cloud computing to get recognized benefits. It also helps organization to reduce their cost by informing them about investment in cloud technology. The amount of complexity can be reduced and organizational agility can be enhanced with effective adoption of cloud computing. Various risks associated with cloud computing are also discussed in this research study, which inform current users about its difficulties and how to overcome those difficulties. Therefore, this study is beneficial for target area (SMEs) and also for the general readers who want to gain some information about this particular topic.

2 THEORATICAL BACKGROUND

This chapter reviews literature relating to cloud computing concepts and services in order to discuss its implementation in SMEs. Basically, the literature review has been organized in three sections. First section covers the important concepts and characteristics of types of cloud computing. The second section covers the use of cloud computing in SMEs and explains its different types. Whereas in third section empirical evidence on subject matter are discussed briefly.

2.1 Concept of Cloud Computing

Many organizations use cloud computing models to deliver different IT services with the help of internet or interacted IT environment. In simple way, cloud computing can be characterized as the storing and retrieving information for business purpose over the internet rather than using hard drive of computer (Sultan 2013, 272-278). The term cloud is only used as a metaphor to represent internet, as it also focus on an enormous pool of operational resources, for instance, software and hardware which can be accessed by using internet (Vouk 2008, 235-246). Different computing services are offered by cloud computing in a commoditized way, and these services are used similar to basic utilities such as water, gas, electricity, etc. Therefore, some research studies perceived cloud computing as a basic utility which is used by organizations on a daily basis to fulfill their basic computing requirements (Buyya et al. 2009, 599-616).

Cloud computing does not have a single definition as this concept has changed over time with the advancement of internet. In literature, no standard and approved cloud computing definition is used as most of the time it is considered as the computing services provided by third party via internet (Abdollahzadegan et al. 2013, 67-74). However, Marston et al. (2011, 176-189) defined cloud computing by focusing on its key advantages from both technological and business perspective, cloud computing is an IT service model which provides both software and hardware computing services on-demand to its consumers. The network system used in cloud computing is self-serviced, independent of location and device. The remote servers are used to store, process and manage data which are accommodated on the internet without the involvement of personal computers or local servers (Stallings 2007, 202-245). It enables the organizations to use computing resources whenever needed without building and maintaining any infrastructure physically.

Cloud computing is a wide-ranging and quickly advancing idea, therefore SMEs should understand cloud computing comprehensively to adopt better approaches towards the utilization of cloud computing services (Velte, Velte & Elsenpeter 2009, 47). Basically, the idea of cloud computing depends on the pre-existing concepts such as virtualization, grid computing and distributed computing. Although it is not relatively new field of study but it can be differentiated based on the novelty of idea to deliver computing services to general consumer as utility (Stallings 2007, 202-245). The broadly accepted definition of cloud computing is provided by the National institute of Standards and Technology (NIST) United States, as cloud computing is a model for empowering expedient, on-demand system access to a shared pool of configurable computing resources which can be quickly provisioned and discharged with slight effort of administration or interaction of service provider (Mell & Grance 2009, 50).

2.1.1 Basic Model of Cloud Computing

A shift in the utilization and delivery of IT services is characterized as cloud which enables the organization to simplify technological development and manage this process more efficiently. The introduction of cloud models industrialized the IT supported services in the market, as it provides the cost effective and flexible access to technology. In this way, businesses can get information on demand at lowest expense which enables them to work smarter (Zhang, Cheng, & Boutaba 2010, 7-18). The Figure 1 is showing a basic model of cloud computing which specify the simplest process of accessing application and storage with a common network or main server (Open Group 2015, cited 02.09.2015). These services are shared among different business organizations, and retrieved by service users. The service users of cloud computing can be customers, remote workers, members of the organization working on premise or general public. The cloud computing services can be utilized by any of them at minimal service cost (Buyya, Broberg & Goscinski, 2010, 599-616).

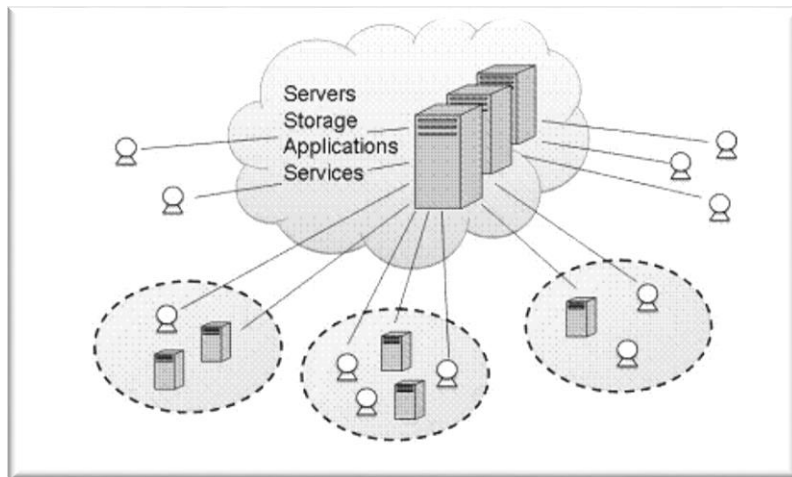


Figure 1: Basic Cloud Computing Model (Open Group, 2015, cited: 02.09.2015)
http://www.opengroup.org/cloud/cloud/cloud_sme/benefits.htm

Cloud computing provides an opportunity for end users to control the resources of their interest. It also permits them to make changes and flexibilities in resource consumption in order to manage workload effectively. Moreover, these resources can also be stored by users for further use (Dikaiakos et al. 2009, 10-13). It also minimize the organization's effort and time towards marketing management and smooth the innovation process and speed (Buyya, Broberg & Goscinski, 2010).

2.1.2 Characteristics of Cloud Computing

It is important for any organization and particularly SMEs to understand the basic characteristics of cloud computing in order to implement its services efficiently. Fundamentally, cloud enables the users to expand their capacity by offering self-services entrances in remote servers (Gong et al. 2010, 275-279). The following are some important characteristics of cloud computing identified by National Institute of Standards and Technology.

1. **On-demand Self-service:** The cloud computing provide self-service portals to its users, where they can access basic IT services such as storage, server time without interaction of human.
2. **Rapid Elasticity:** The provision and issue of IT resources is elastic and can be accessed on-demand. The automated access is allowed to users; however there are some parameters and triggers fixed in system. The resources provisioned to users are

unlimited, as the exact capacity is available on time to meet the needs of a specific application (Stallings 2007, 202-245).

3. **Resource pooling:** The service providers merge different IT resources such as memory, storage, processing and network bandwidth, and supply these pooled computing resources to multiple customers. However, these resources are separated and secured based on logical level to meet the dynamic demand of multiple customers (Zhang et al. 2010, 7-18).
4. **Broad network access:** Service users can access the cloud computing resources from main network or server. Mainly, these resources are retrieved by many different devices such as user mobile phones, tablet devices, workstations, laptops and computers (Stallings 2007, 202-245).
5. **Measured service:** The resource use is automatically controlled and improved by computing system, as it utilize a metering competence which is appropriate to different services such as bandwidth, processing, storage and dynamic user accounts. Asset utilization can be observed, controlled and stated by offering transparency for both service users and service providers. This attribute of cloud computing empowers a services user to expend the administration in a "pay as you develop" model or for inner IT divisions to give IT chargeback abilities (Gong et al. 2010, 275-279).

Ahson & Ilyas (2010, 59) emphasized on the fact that virtualization is not main objective of cloud computing, it also focuses on innovation where technology is utilized as service whenever needed. It is important for users to have complete knowledge about implementation and usage of particular cloud computing service, such as infrastructure and internet requirements (Thain & Moretti 2010, 153-171). It enables the service users to understand the services available in cloud computing market and how these services are used to achieve organizational objectives. Moreover, the understanding about characteristics of cloud computing help the users to manage self-service portals (Stallings 2007, 202-245).

2.2 Importance of Small and Medium Enterprises

SMEs cannot be defined with an exact and universally accepted definition, as diverse countries and industries perceived SMEs differently according to their business culture (Armbrust et al. 2010, 50-58). There are different criteria considered by many authors in literature to characterize SMEs such as investment level, total assets, sales turnover and number of employees in an organization (Gibson & van der Vaart 2008, 203-248). According to Statistics

Finland, SMEs can be characterized as an enterprise where the numbers of employees are less than 250; the annual turnover is less than EUR 50 million and the total of balance sheet is no more than EUR 43 million. The limit of annual turnover and annual balance sheet total were EUR 40 million and EUR 27 million respectively before 2003. A business which is not satisfying the above mentioned criteria is not allowed to own more than 25% of the voting rights or capital of a SME. A small business is mostly managed by owners and the business operations are conducted from a specific premise (2015 cited 24.08.2015). Small enterprises are registered with local authorities and formally operated by 5 to 100 employees. These employees work full time in an organization without getting higher incentives. On the other hand, there are mostly 100 to 250 employees working in a medium enterprise (Viitaharju 2008, 401-425).

In modern economies of developed nations, the SMEs are considered as an essence of their economic progress because a large number of jobs are created by SMEs as compared to large businesses (Rao, Metts & Monge 2003, 11-32). A variety of goods and services are offered by SMEs which facilitate customers with more options, some of which might not be delivered by large enterprises on low prices. The development of manufacturing sectors, arts and sports is not possible without growing intervention of SMEs because they act as a catalyst for economic growth in a country (Viitaharju 2008, 401-425). Falkena (2000, 14) explained the fact that SMEs has great potential to expand their operations and grow as large industry. He further emphasized on the decentralization of power in SMEs, which introduced a new management layer among SMEs operator and their employees. The management is now responsible for innovations and technological interventions such as cloud computing which may increase the level of development in locally employed business sector (Neves et al. 2011, 1-11). The SMEs are also playing a significant role in the economic development of Finland, as there are approximately 283,290 SMEs which are providing 65% of employment in country. A large number of Finnish enterprises (approximately 93.4%) have less than 10 employees while 98.9 % are medium enterprise working with 50 employees. Finnish SMEs generate 16% of export revenue and 50 % of the combined turnover of all businesses in country (Yrittajat 2015, cited 24.08.2015).

2.3 Cloud Computing and SMEs

The business competitiveness can be improved with the utilization of advanced information and communication technologies (ICT). SMEs can also be benefitted by the use of ICT as it makes them able to compete in market with large organizations (Ahson & Ilyas 2010, 59). The complexity of management issues related to networking, software and hardware are increasing in

traditional IT environments. So, it is essential for SMEs to employ IT specialists in order to implement and maintain the IT services. Cloud computing offers an appropriate solution of these IT issues by providing scalable capabilities and infrastructure to SMEs (Sharma et al. 2010, 144-149). According to Vouk (2008, 235-246), cloud computing also provides the immediate access to modern solutions of information technology, which enables the SMEs to expand their services by enhancing customer interaction and market reach. It maximizes the SMEs return on their investment and helps them to operate in ever demanding corporate environment effectively (Velte, Velte & Elsenpeter 2009, 47).

The idea of cloud computing in SMEs does not only indicate the improvement in technological data centers, but it also specify the fundamental change in IT services such as how these are used, provisioned and released to users from one place (Sultan 2011, 272-278). As compared to large business industries, the access of SMEs towards human and financial resources is low. Therefore they do not have the ability to effectively upgrade their IT systems in order to meet changing business requirements effectively. Their incapability of implementing modern technologies in business also reduces their chances to participate in highly advance business environment and to contend with prevailing competitors (Sharma et al. 2010, 144-149). However, the adoption of cloud computing enables a variety of services for SMEs, such as provision of storage services, collaboration, IT infrastructure, more specifically private cloud infrastructure. Therefore, SMEs which are operating with small IT departments can rent IT services rather than buying by utilizing their limited resources. Literature about cloud computing adoption by SMEs indicate that these enterprises are motivated to use cloud computing services through internet in order to enhance their business capabilities (Alshamaila et al. 2013, 250-275).

2.4 Cloud Computing Structure in SMEs

According to Peng et al. (2009, 23-27) SMEs should classify their IT requirements in different cloud computing categories in order to make effective decisions about technological structure. These services are able to meet every IT requirement of SMEs with constant support of telecommunication and IT industries. The following are four basic categories of cloud computing services which are recently available for SMEs.

2.4.1 Infrastructure as a Service (IaaS)

The least disrupting cloud computing service adopted by SMEs is infrastructure as a service, also known as IaaS. The SMEs can get virtualized computing services through internet by using IaaS,

as IT stacks and servers are based on this service which also enables the software as a service and platform as a service (Peng et al. 2009, 23-27). A third party is involved in an IaaS model, who operate as a host to offer software, hardware, storage, server and other components of infrastructure to service users. It also handles user's applications and offers backup solution, system maintenance and resiliency development (Weinhardt et al. 2009, 391-399). Highly accessible resources are offered by IaaS platforms which can be managed on user demand. Therefore, the IaaS is most suitable for temporary and experimental workload which can be changed unexpectedly (Giessmann & Stanoevska-Slabeva 2012, 31). The cloud providers in IaaS can be differentiated based on their service legal agreements (SLAs), their pricing and their performance (Mujinga & Chipangura 2011, 196-203).

2.4.2 Platform as a Service (PaaS)

The platform as a service (PaaS) offers an interesting solution for IT related SMEs who are involved in the development of applications. A hosted environment is offered by PaaS which enables the SMEs to use web-based platform and develop applications online (Lawton 2008, 16-19). PaaS likewise provides the infrastructure like development software, hardware and operating system to service users which help them to develop new application without making heavy investment. They can rent PaaS services which offer an entire lifecycle of application development (Giessmann & Stanoevska-Slabeva 2012, 31). Zhang et al. (2010, 7-18) stated the association of infrastructure as a service and PaaS as it deliver an operating system over the internet which eliminate the need of downloading and installing software on end-user system.

2.4.3 Software as a Service (SaaS)

Software as a service (SaaS) is basically a distribution model, where service providers or vendors host the applications and use internet network to deliver these applications as a service to customers (Peng et al. 2009, 23-27). It is also referred as on-demand software because applications are licensed on subscription basis. This is the most valuable computing service for SMEs because it is supported by the "plug and go" notion where SMEs can get IT resources from public cloud or other service providers, and deliver those resources to their customers (Lawton 2008, 16-19). Meanwhile, the IT organization play a role of IT service broker to provide basic services to SMEs. An IT solution is provided by SaaS by utilizing software, bandwidth and server. SMEs have option to choose the service provider who has required solution which can be

accustomed according to the workers need. However, it is important to make sure that the service access is guaranteed by the service provider (Azodolmolky, Wieder & Yahyapour, 2013).

2.4.4 Communication as a Service (CaaS)

SMEs can lease communication solutions from a cloud computing service provider, this process is categorized as communications as a service (CaaS). It enables the SMEs to utilize Unified Communications and Voice over IP services without making any hardware investment because the required infrastructure is managed by cloud provider (Youseff, Butrico, & Da Silva 2008, 1-10). CaaS is a basically outsourcing model for business communication which can be used by the organization to increase efficiency and reduce cost by involving telecommunication (Conway et al. 2014, cited 20.09.2015). A wide range of cloud services are available to SMEs, however it is important for enterprises to analyze their IT requirements and workload before the adoption of any cloud computing model (Rath et al. 2012, 688-691).

2.5 Empirical Evidences

An emerging paradigm of information technology is cloud computing which provides web-based computing services to its customers. Sultan (2011, 272-278) discussed the cloud computing approach by focusing on the existing technologies such as grid computing, virtualization and internet. The study also concentrates on the identification of some constraints which organizations face while adopting cloud computing model. However, there are some unique aspects of cloud services which make this viable for SMEs, such as on-demand and flexibility. One other important feature is pay-as-you-go, which limits the stretching of financial resources to fulfill IT requirements, and manage an appropriate cost structure for SMEs which increase their competitiveness and make them able to operate in change economic situation.

Rath et al. (2012, 688-691) conducted a research study to assess the adoption of cloud services in Indian SMEs. Organizations can concentrate more on their core business operations when all the IT requirements are outsourced with the help of cloud computing technologies. Many firms in India have adopted the cloud service approach in order to decline their operational cost without undermining the need of their customer. Nonetheless, in case of SMEs there is less trend of outsourcing and use of cloud services. An initial survey is conducted by Rath et al. (2012, 688-691) to identify the major reasons for SMEs to adopt services. The findings of the study indicates that cloud computing can be more beneficial for SMEs if it is used for computation intensive tasks such as modeling, data mining and simulation. They also identified some other benefits of cloud

services, for instance, efficient use of computing system, low level of hardware investment, faster upgrades of software.

Now a days, cloud computing is a much argued subject in literature. IT professionals are trying to identify more and more logics to explain its uniqueness and to implement cloud services in business environment. In a research study Abdollahzadehgan et al. (2013, 67-74) advocate the cloud computing by providing a list of its benefits which motivates an organization to adopt it. However, some disadvantages of cloud service are also discussed in their study to inform businesses about risks associated with this system. They further discuss the SMEs need to adopt cloud computing, as the SMEs cannot fulfill their IT requirements efficiently because they do not have enough human and financial resource to deal with over-demanding market. Mainly, the research study focused on the TOE framework (Abdollahzadehgan et al., 2013. 68) which includes technological, organizational and environmental factors for the evaluation of cloud computing adoption in SMEs. A detail review of previous literature has been conducted by the researchers to identify the critical success factors based on the chosen criteria. The finding of the study indicates that technological factors such as complexity and compatibility are more important which motivate the adoption of cloud services in SMEs.

The inefficiencies of SME sector can be addressed with cloud computing services as it also make a vital contribution towards the competitiveness and growth of these enterprises. It enables the SMEs to obtain advanced technology without paying any upfront cost. Sahandi, Alkhalil and Opara-Martins (2013, 1-12) explored the different perception of SMEs about cloud computing adoption by discussing the major requirements and motivation concerning cloud services. A quantitative approach is adopted and survey is conducted from 300 SMEs operating in UK. The results of the study indicate that SMEs have more concerns about vendor lock-in and security breach which are influencing the adoption of cloud services in UK.

In today's digital age, cloud computing has become the buzzword for web-based IT services. The concept of cloud computing became more famous with the advancement of internet, broadband, improved bandwidth, mobile devices and increasing mobility requirements of end-users. Gupta, Seetharaman and Raj (2013, 861-874) argued on the SMEs preferences towards cloud computing and its perceived benefits. IT requirements of SMEs are different from large business, so the cloud usage in SMEs is also influenced by different factors which are discussed in their research study. Five major factors are identified in which most favorable factor is convenience and ease of use. Second important factor is security and privacy while the third cause for

adoption of cloud is lower cost or expense. However, the fourth factor identified was reliability which is not supported by results because cloud service is not considered reliable by SMEs. One other unfavorable factor is old conventional method, which is preferred by SMEs to share and collaborate with their stakeholders because they do not trust cloud for sharing their private data.

Alshamaila, Papagiannidis, and Li (2013, 250-275) conducted a research study to analyze the adoption process of cloud computing in SMEs. They identified that the access to scalable technologies enables the SMEs to compete large business in market by delivering modern products and services. A qualitative exploratory study is conducted by using interviews as a tool to collect primary data. SMEs operating in north east of England were selected for data collection, as that region aspires to become home of digital innovation and have large number of enterprises. Technological, organizational and environmental (TOE) framework is used as the theoretical base of this study and findings indicate some major factors which play important role in adoption of cloud services by SMEs. These factors includes market scope, innovativeness, geo-restriction, uncertainty, compatibility, firm size, relative advantage, supplier effort, external computing and top management support. However, there are no significant evidence has been found on competitive pressure as factor of cloud computing adoption.

Enterprises are showing lot of interest in cloud computing since its inception, as it enhances the business value by offering technological solutions. However, there are some obstacles faced by organization adoption of cloud services such as higher management experience, standards and regulations. El-Gazzar (2014, 214-242) explored major issues related to adoption of cloud computing by presenting a systematic literature review on subject matter. He has reviewed 51 academic articles about adoption of cloud computing and its benefits. The grounded theory approach (Pandit 1996, 1-15) is used to classify the articles in eight main categories, further these articles are classified in to abstract categories which involve process and factors of cloud computing adoption. Findings of the study indicate that there are many critical issues faced by SMEs in adoption of cloud services. Moreover, the researcher recommended the use of information systems (IS) in order to explore the under-investigated areas concerning process and factors of cloud computing.

Cloud computing refers to the movement in IT model which increase the efficiency, agility, and flexibility of an organization. However, there is a lack of research on adoption of cloud computing technology in SMEs. Conway, Curry and Donnellan (2014, cited 20.09.2015) attempted to fill literature gap and conducted a case study to discuss the challenges faced by SMEs. They have

used a framework named IT-CMF (Conway et al. 2014, 2-4, cited 20.09.2015) to address the identified issues. A startup company which was involved in technological research was considered as a sample, and a highly concerted research plan constructed on design science principles was discussed by applying the concerned framework. A measurement competency enabled by the framework guaranteed that risks associated with cloud computing were eliminated. Findings suggest that IT-CMF framework is invaluable tool for SMEs as it maximizes the opportunity for cloud computing in a controlled and planned way.

A research study is conducted by Adam and Musah (2015, 115-139) to explore the need of cloud computing in SMEs operating in developing countries. An exploratory approach is adopted to conduct a qualitative study. They reviewed 95 research articles on cloud computing and categorize these articles by developing a framework. The research activity is differentiated based on lifecycle model which includes the needs, requirements and desires of SMEs which leads towards the adoption of cloud computing. The research study further highlighted an unbalanced utilization of quantitative methods and absence case study usage to frame the theoretical basis in this subject. Additionally, literature gaps are recognized which indicated the obstacles of cloud computing in SMEs are ignored, while adoption of cloud computing is widely discussed. Their research study focused on identification of key research gaps involving conceptual framework, issues and techniques.

3 USE OF CLOUD COMPUTING IN SMES

There is a major role of cloud computing in addressing the ineffectiveness and inefficiencies of SMEs. It also contributes in the fundamental competitiveness and growth of SMEs. After the adoption of cloud computing, SMEs can be able to effectively utilize modern technology along with cutting upfront cost (Oliveira & Martins 2010, 1337-1354). Therefore, this chapter is going to discuss the advantages and disadvantages of cloud computing with regards to SMEs.

3.1 Cloud Computing Advantages

As cloud computing is modern technology, so these services are currently used by different types of companies. It is expected by the IT experts that the growth of cloud computing will be increased in next few years. Cloud computing is highly beneficial for mid-size and large companies but now smaller firms are also adopting and using its benefits to increase their businesses. Companies are offered benefits through cloud computing as they implement such services and thus will be resulted in development of IT in all types of SMEs along with industries and universities (Adam and Musah 2015, 115-139).

3.1.1 Cost Savings

Cloud computing is mostly helpful in IT cost cutting. This is also helpful for all businesses including small, medium or large as it helps in maintaining operations and capital expenses to least minimum amount. Further, it is also helpful in saving substantial cost along with application requirements and zero in-house server storage (Gupta et al. 2013, 861-874). Operational costs of the companies also decline due to less on-premises infrastructure in terms of administration, air conditioning, and power costs (Zhang et al. 2010, 7-18).

3.1.2 Scalability/Flexibility

These days most companies are focusing on data management centers due to high scalable cloud computing nature and for this purpose cloud experts are trained to maintain hybrid, private, and shared clouds. Companies get quick resources allocation in controlled environment in which overloading is not concerned for the time as system is properly managed (Conway et al. 2014, cited 20.09.2015).

3.1.3 Reliability

Cloud computing service is highly reliable due to managed service provider and it is consistent as compared to in-house IT infrastructure. Usually service providers offer their services in 24/7/365 with 99.99% reliability. Services can be easily transmitted to further available servers in case of failure of applications (Gupta et al. 2013, 861-874).

3.1.4 Maintenance

Cloud computing is easy to manage as it is not required to install in every single computer and thus can be reached from different locations. Features of cloud computing platform helps service providers to maintain, host, develop, and test applications in cloud. In this way, developers can modify and launch different programs as compared to setting up systems and infrastructure themselves (Weinhardt et al. 2009, 391-399).

3.1.5 Minimize licensing new software

Cloud computing strategies are used to custom tailor solutions to the company and thus company needs cloud IT with fully integrated, dynamic and robust computer systems with completely web based. In this way applications, files, and emails can be accessed easily with any internet connection and thus need of software and hardware is also decreased in this way. Thus companies need less licensed software (Lawton 2008, 16-19). Therefore companies can now grow without investing larger amount on licenses.

3.1.6 Innovation

Cloud computing is enabling the companies to interact with customers, employees, and partners in a different way. Companies can get highly incredible business opportunities which can help them to build real-time interaction and innovation to flourish their enterprise (Alshamaila et al. 2013, 250-275).

3.1.7 Multiple Users at same time

Cloud computing is also helpful in increasing the effectiveness of shared resources. Multiple users not only share these resources but allocate dynamically as per demand. Further, it is also helpful for multiple users to retrieve their data through single server and update data without buying license (Zhang et al. 2010, 7-18).

3.1.8 Its Green

Cloud computing is best and most effective for future use. According to Blaisdell (2014), companies can increase their return by 200% by using cloud computing. Software development and IT industry is also fundamentally changing in order to adopt modern technologies. In this way, they can help to save environment by using less servers and other resources (cited 22-09-2015)

3.2 Cloud Computing Disadvantages

There are different potential advantages of cloud computing enterprises which are discussed above in detail but still some factors need to be worried by the company's management. Therefore, cloud computing have some disadvantages for SMEs which are as follow.

3.2.1 Lack of Control

Cloud computing is fully owned, managed and monitored by service providers and thus customers have minimum control over it. Therefore, customers only have control over services, data, and applications. Further, customers do not have access to administrative tasks like firmware and updating management, and access to server (Gong et al. 2010, 275-279).

3.2.2 Network Dependency

Cloud computing is completely internet dependent service. This is major drawback of cloud computing because full dependency of cloud to internet led to prone service outages at any time. Service interruption can occur during transactions, file transmission, or other tasks and as a result task can be delayed (Stallings 2007, 202-245).

3.2.3 Risk

Every single cloud computing component is highly accessible from internet server. However, internet connected services are not secure and sometimes IT teams have to suffer from hard security breaches and attacks (Yang & Tate 2009, 2-4).

3.2.4 Essentially need an Internet connection

In IT department, cloud computing is excessively used as an essential feature but the most important part is availability of internet. Computer networks and in-house servers are also

replaced but employees are not able to access data without an active internet connection (Sultan 2011, 272-278).

3.2.5 Migration Issue

Migration to cloud computing is tricky. There are some common challenges in this regard, which consist of identification of right cloud vendors, effective management of cloud resources, and transitions of IT hardware and investments (Marston et al. 2011, 176-189).

3.2.6 Continuously Evolving

Cloud computing, storage, networking, and interfaces requirements of the customers are continuously changing. Such evolving parameter shows that cloud cannot be static and continuously changing with the passage of time (Durkee 2010, 20).

4 RESEARCH METHODOLOGY

Research methodology is considered an important part of research study as it explains the most suitable research approach which can be used by researcher (Hancock, Ockleford & Windridge, 2009). In this research study, the methodology includes discussion of research philosophy, research design, research approach, sampling, data collection and data analysis techniques.

4.1 Research Philosophy

According to Widerberg (2011), there are three basic philosophies used in a research known as hermeneutics, positivism and interpretivism. In this way, the researcher can collect required information effectively by avoiding any resemblance.

The application of positivism approach allows the independent view of research study without interfering in existing phenomena (Remenyi et al., 1998). Numerical analysis is involved in positivism approach, so it is more tend towards statistical and quantifiable perspective. In quantitative research study, positivism is considered as most appropriate research philosophy (Bessant et al., 2003).

In case of hermeneutic approach, existing facts and figures are examined to obtain in-depth understanding of research issues. This approach focuses on detail investigation of subject matter and discuss subjectively, therefore it leads towards qualitative approach (Eriksson & Wiedersheim, 1999).

On the other hand, naturalistic methods are focused in interpretive approach, which involves observations, interviews and use of existing literature. An appropriate discussion among researcher and participant is arranged to construct a meaningful reality.

The interpretivism approach is more appropriate for this research study as compared to positivism approach because there are many behavioral and technological advantages of cloud computing which cannot be measured exactly in numbers. One other reason for selection of interpretivism approach in this study is the existence of relevant literature on subject matter. Therefore, in this research study interpretivism approach is used to discuss the advantages of new technology named cloud computing in SMEs. The investigation is made by focusing on current operations and strategies of SMEs to analyze that which factors are getting more benefits from this advanced technology.

4.2 Research Design

A research design has an important role in simplifying the preliminary research assumption by applying diverse methods (Rudestam & Newton 2014, 29). Furthermore, the general research

methods are also divided into small sections which discuss research population, sampling, data collection and data analysis techniques. Two basic research approaches are available to design a study which includes quantitative and qualitative approach.

In qualitative research method, beliefs and perception are discussed such as experience of some participants in specific social setting. It helps to understand social behaviour of individuals towards a specific situation therefore small sample size is preferred in qualitative research design. There are two different methods which are used in qualitative study, known as focused group and interviews. However, in case of quantitative study the numerical structure of obtained data is important. A certain research phenomenon is categorized by using a specific hypothesis, which is further accepted or rejected based on findings. It also has two different methods for data collection, such as observation and use of structured questionnaires in research survey.

In this research study, the qualitative research method is adopted in order to analyse the individual perspectives about advantages of cloud computing in SMEs which further leads towards adoption of this technology.

4.3 Research Sample

The population of research study was the SMEs operating in Finland and using cloud computing. The research sample is selected by using convenience sampling method. The convenience sampling method is best suitable when the data is to be collected from large sample group. It is most suitable method as compared to other sampling methods because it provides an opportunity to participants to give their views based on their preferences and researcher can be able to access data on his convenience. Six different SMEs were selected which were using cloud computing in order to discuss advantages of cloud computing which further led them towards adoption. The selection criteria of sample were based on time duration of cloud computing such as the SMEs using cloud computing for one year.

4.4 Research Instrument

In this research study, the interview method is utilized to gather required data from selected research sample. A set of questions (appendix) is designed by focusing on different aspects of cloud computing in order to collect responses in interviews. The main discussion of interviews revolves around research objectives in order to address underlying research problem. An open-ended questionnaire is developed as a research instrument to gather data from participants.

4.5 Data Collection

Mainly, primary research method is adopted for data collection as discussions over the phone and also few meetings were arranged to conduct one to one interview from respective IT personnel. A pre-planned schedule among researcher and participant is decided for data collection which is managed according to the convenience of respondents.

4.6 Data Analysis

The collected data is summarized and discussed by focusing on major formats. It further emphasized on reason which leads these SMEs towards adopting. The discussion is linked with existing literature in order to support the research findings.

5 DATA ANALYSIS AND DISCUSSION

Cloud computing is one of the biggest effect among all the new technologies which has been introduced during the last few years. The organizations views about technology have been changed because they can implement simple and effective solution with help of computing. It also enabled them to be creative and interact with customers more efficiently. Moreover, cloud is easy to deploy and cost effective which makes possible for organization to experience advanced technologies. The IT sector has become able to produce new items and distribute these items to a wide network.

In this study, interviews from different IT personnel have been conducted to find out the different factors in SMEs which drove them toward adoption of cloud computing for their enterprises. It has been observed that most of the SMEs consider advanced technology as a critical success factor so cloud platform is implemented to meet this requirement.

5.1 Summary of the Interview

In SMEs, different types of clouds are used to run their operations. As observed in interviews most of the organizations are using public cloud which are owned and operated by isolated business in external environment. There are also some SMEs which are using private cloud which are operated and owned by themselves while use of partner cloud has been also noticed. In SMEs, a trend of hybrid cloud computing is also observed where cloud services are provided by different sources such as both private and partner. In case of cloud operating system, commonly used packages in SMEs are SaaS and CaaS which helps them to manage their business operations effectively. It provides different services such as network capacity, storage, communication facilities etc. However, there is a less use of PaaS via cloud computing in order to develop new applications because of high risk in environment.

Many SMEs are using cloud computing in order to reduce capital expenditure which further lowers their cost, as they can avoid the expense of buying hardware and licensing software. One other reason is to manage effective IT support because it is difficult for small organizations to hire highly experience IT specialist and operate a whole tech department. Moreover, scalability and flexibility of IT resources is another observed reason which leads SMEs towards adoption of cloud computing. Agility of services increases the opportunities to use advanced technologies in these small organizations which increase firm profitability. However, they are facing some hurdles in utilization of cloud computing in SMEs such as it decreases the level of internal control in

organization when they outsource a large number of services. It is difficult for SMEs to manage reliability of IT operation on clouds, because there is high level of security risk in environment. Service legal agreements and vendor lock in are also biggest challenges for SMEs in adoption and implementation of cloud computing. But the best thing is that, these hurdles can be managed with effective strategies and planning.

Cloud computing services are utilized to manage different business processes in SMEs, such as management of sales data, creation of payroll by using specified software, administration of financial records. It also helps SMEs to manage research and development activities and provide solutions for data analysis, in this way organizations can become more informed about change in technological areas and innovative. However, a problem arises when secure services cannot be achieved by a single cloud system. Therefore, more reliable solution for this issue is Hybrid cloud where automated services allow the users to control their data on networks. In this way, some SMEs are managing security and privacy concerns of their organization appropriately.

5.2 Use of Cloud computing in SMEs

After the identification of some innovative technology and its perceived benefit, SMEs would like to adopt that technology. Therefore, it is important for SMEs to have complete knowledge of cloud computing and its relative advantage. According to analyzed data, it has been found that cloud computing is considered as an important and interesting technology in SMEs. Most of SMEs are attracted towards use of cloud services to run their business operation, and trying to reduce some minor drawbacks of clouds by implementing adequate plans. However, there was lack of awareness among SMEs about cloud computing which became major reason for the late adoption of this technology. SMEs current users of cloud computing are well aware of its benefits as it has made them more competent and successful in market. Such as, SMEs have more control over their IT operation and expenditure because of cloud mobility and scalability. The major reason behind the adoption was that the SMEs were not satisfied with their existing infrastructure as it does not meet their business expectation. Implementation of cloud computing can be more easy for them after conducting a brief analysis of its advantage.

Uncertainty was another important factor in adoption of cloud computing, because major concerns of SMEs were privacy and security of data. It was also a complicated issue to relinquish ownership to an external entity by accessing cloud computing services. However, these issues are somehow addressed by establishing relationship with reliable service providers. As per views

of one participant, it is quite risky when some other organization has your confidential data but there should be an element of interest to run a successful business. However, there are also some other solutions used by SMEs such as signing of confidentiality agreement in order to secure their data. Another identified fact is that, some early adopters trust their service providers, which leads these SMEs towards implementation of cloud computing. Overall, SMEs are satisfied with cloud computing services as it is compatible with their IT structure and easy to use. It is important for any advanced technology to provide user friendly and comfortable services. In case of cloud computing, it has been observed that its services are consistent with the organizational values and technology requirements.

In cloud computing services, SMEs have options of trial-ability which allow them to use these services on trial bases before implementation. It has great impact on their decision about adopting a particular service but it is also very useful as it provides them an opportunity to choose most suitable service providers. However, it has been found that trial-ability of cloud computing services mostly have positive effect on SMEs about adoption. It is also useful for them because of small size of organization, as participant believe that it is quite easy for them to follow agility of cloud computing and change direction whenever needed. Flexibility is another important factor which motivates SMEs to choose cloud services, as it allows them to control their density and avoid capital expense.

5.3 Reasons for adopting Cloud Computing

The following are some important reasons observed in this study, which motivates small and medium enterprises to adopt cloud computing services.

Flexibility and Scalability in resource utilization An unmatched flexibility is offered to SMEs by cloud computing which allow them to manage their versatility and usage policies. One of the most important benefit of cloud computing is provision of data storage facilities which motivates SMEs to move on to clouds. In fact, more than half of the population adopted cloud computing because of this factor. Data storage facilities are flexible on clouds, as SMEs have to pay only for that volume of space which they consume. In this way, they can increase or decrease storage space whenever required to meet business requirement. Therefore, cloud computing provides a relative advantage to IT business which require availability of resources on demand to experience rapid growth.

Cost Effectiveness As discussed above flexibility and scalability in resource utilization leads an organization to reduced operational cost and capital expenditure. It also allows SMEs to control

financial spending on extensive upgrades as cloud computing assists them to install continuous updates at very reasonable costs. In case of any maintenance requirement, SMEs do not have to pay any expenses because it is a responsibility of the vendors to update, upgrade and maintain a cloud. Moreover, it enables them to compete in market by offering a cost reduction structure and advance IT solutions. As findings of this study suggest that, most of the SMEs saved a significant amount of their IT expenses after the adoption of cloud computing in very less time.

Lower Technology Risk Apart from the financial advantages of cloud computing, its ready to use infrastructures reduce the level of technology risk in SMEs. Major cloud providers in industry offers guarantee for their clouds and risk of data unavailability is also minimize because of cloud computing. In this way, the SMEs have more trust on cloud providers which allows them to use their storage.

Data Security At the beginning, SMEs have many concerns about security breaches and data losses on a cloud. However, after evolvment of cloud computing and some advanced changes in this technology security concerns have been reduced. Recently, cloud computing is used at a secure network because it offers high level of security and integrity of user data.

Effective IT support The corporative productivity of SMEs has been enhanced with the implementation of cloud-based frameworks in IT sections. SMEs can get effective support anytime because cloud computing enables their service providers to work from devices. Highly specialized IT personnel can offer their services to SMEs from anywhere in the world at reasonable cost. SMEs can spend more on training of their human resources, when other costs are reduced because of cloud computing. In this way, organization performance can be highly improved by following some effective strategies.

Technical Skills These days organizations are trying to reduce paper work, so it increase level of IT utilization in all parts of organization. Therefore, it is important for them to have highly skilled IT specialist with effective knowledge of computing who can help them to maintain and update their work online. The implementation of IT applications associated with cloud computing can help SMEs to choose better way to increase technical efficiency, which further enable them to compete in market.

In spite of some security concerns, the level of risk in cloud computing is not much higher. Cloud computing can offer best solution to small enterprises and ensure high level of output from cloud investments when right organization is selected as cloud partners. In last few years, a rapid change in IT environment has increased the trend of cloud adoption in SMEs which can be more efficient with help of clear understanding in this regard.

6 CONCLUSION AND RECOMMENDATION

The introduction of on demand computing services have gradually modified the way, how IT services are developed. "Computing services on-demand" is gradually modifying the way information system services are developed, maintained, upgraded and paid for. The initiation of cloud computing can be associated with earlier outsourcing trends such as virtualization. However, the cloud computing is based on a novel idea which involves high speed internet connection to provide all IT service at one platform (Sultan 2011, 272-278). In this research study, an initial attempt is made by researcher to explore the advantages of cloud computing in SMEs operating in Finland. Cloud computing is an evolving concept which has rapidly emerged and adopted in last few years particularly SMEs. It is most suitable technology for SMEs, as they are not able to attain technical expertise due to lack of adequate resources. Cloud computing allow them to establish an appropriate IT infrastructure which enables SMEs to compete in business market efficiently.

A systematic review of literature is conducted in this study in order to discuss different concepts of cloud computing to enhance level of understanding. Empirical evidences on subject matter suggest that there is an increasing trend of cloud adoption in developed countries specifically in Europe. Whereas, Finland is one of the major country which is using cloud computing. In fact more than half of the Finnish enterprises are cloud computing users. Despite this fact, there are still some SMEs which are unclear about the adoption of cloud computing. Therefore, major reason and benefits associated with cloud computing have identified in this research study, which further enables SMEs to make best decision about adoption of cloud services. Based on theoretical analysis, some key advantages and disadvantages of cloud adoption in SMEs are also discussed in order to get in depth understanding of underlined research issues. Most important advantages are cost reduction, flexibility, reliability, innovation and agility. However, there are also some challenges faced by SMEs in adoption of cloud computing which involves security and privacy concerns, lack of control, network dependency, continuously evolving nature etc.

The qualitative research approach is adopted in this research study and interview method is used for data collection. According to empirical analysis the major factors which are playing an important role in cloud adoption are; lower level of cost, flexibility and scalability of resource utilization, reduced risk, upgraded security resolution, effective IT support and high level of technical skills. Nonetheless, SMEs also face some difficulties after implementation of cloud

computing which are addressed by effective strategies. It has been observed that partner clouds are mostly preferred in SMEs while focusing on SaaS packages.

These research findings are beneficial for SMEs managers, service provider and research community as it can help SMEs managers to analyze benefits of cloud computing by focusing on their business operations. In this way, they can formulate new and effective strategies to adopt and implement cloud services in their enterprise. It can also to uproot any ambiguity of service users about implementation of cloud services in small enterprise. In case of service providers, with help of these research findings they can understand SMEs behavior towards adoption of cloud computing and can design their services by focusing on these specific factors. Service providers can be able to enhance their cooperation with SMEs which are current users of cloud services to develop healthy environment for adoption of cloud computing. One important factor behind the adoption of cloud computing in SMEs is the level of trust on service providers which reduce their security concerns as well.

Five main objectives were established to conduct this research study, as first objective is achieved by discussing how cloud computing can be implemented in SMEs. Different characteristics and types of cloud computing are briefly examined and discussed in study. Potential advantages and disadvantages of cloud computing are analyzed in order to gain in depth understanding and achieve third and fourth research objective. Further, a qualitative approach is adopted to explore benefits of cloud services which lead towards adoption. It was the most important research objective which addressed the research question "Why SMEs should adopt cloud computing service to carry out their business operation". The important benefits of cloud computing are concisely discussed in findings. However, researcher is not able to achieve last objective of research study because of time limitation. Therefore, cloud service providers in Finland are not analyzed as planned thus recommendation for service provider selections could not be made.

Based on these research findings, future research can be conducted by focusing on some specific industry. A different research approach such as quantitative analysis can be used to measure the role of cloud computing increasing firm performance as most important benefit identified is cost reduction. A semi structured interview method is used in this study, which can be modified in future research to get more specified results on cloud computing advantages. Further this research study is helpful for SMEs as it provides them to in-depth understanding of cloud adoption and implementation. SMEs can make better decision in use of technology by following

research findings of this study. Only IT personals working in SMEs are interviewed in this study, nonetheless future research can be conducted by focusing on views of higher management, end users and other stakeholders.

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APPENDIX 1

Questionnaire

- 1: What is the size of the enterprise, e.g. no of employees
- 2: No of years of cloud computing utilization
- 3: Which cloud computing solution you are using in enterprise?
- 4: Which type of Cloud you are using in enterprise.
- 5: Would you be willing to outsource to multiple cloud providers? Ask for reasons
- 6: Which IT services/Applications supporting business processes are most likely to be outsourced to a Cloud Computing service provider?
- 7: What are the reasons behind your possible engagement in the Cloud Computing area?
- 8: What are your main concerns about Cloud Computing?
- 9: What is your opinion about continuously evolving nature of cloud computing?
- 10: Is Are you satisfied with internet connection and speed which is used for cloud computing service?
- 11: Is it easy for you manage your internet service all time?
- 12: Would you recommend use of cloud computing in other SME's? Why?